

STATE OF SOUTH CAROLINA

Application of

Duke Energy Carolinas, LLC
for Approval of Energy Efficiency Plan Including
an Energy Efficiency Rider and Portfolio of Energy
Efficiency Programs.

BEFORE THE
PUBLIC SERVICE COMMISSION
OF SOUTH CAROLINA

COVER SHEET

DOCKET
NUMBER: 2007-358-E

(Please type or print)

Submitted by: Bonnie D. ShealySC Bar Number: 11125

Address: Robinson, McFadden & Moore, P.C.
PO Box 944
Columbia, SC 29202

Telephone: (803) 779-8900Fax: (803) 252-0724

Other: _____

Email: bshealy@robinsonlaw.com

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DOCKETING INFORMATION (Check all that apply)

☐ Emergency Relief demanded in petition ☐ Request for item to be placed on Commission's Agenda expeditiously

☒ Other: _____

INDUSTRY (Check one)	NATURE OF ACTION (Check all that apply)			
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<input type="checkbox"/> Electric/Gas	<input type="checkbox"/> Agreement	<input type="checkbox"/> Memorandum	<input type="checkbox"/> Request for Certificatio	
<input type="checkbox"/> Electric/Telecommunications	<input type="checkbox"/> Answer	<input checked="" type="checkbox"/> Motion	<input type="checkbox"/> Request for Investigator	
<input type="checkbox"/> Electric/Water	<input type="checkbox"/> Appellate Review	<input type="checkbox"/> Objection	<input type="checkbox"/> Resale Agreement	
<input type="checkbox"/> Electric/Water/Telecom.	<input type="checkbox"/> Application	<input type="checkbox"/> Petition	<input type="checkbox"/> Resale Amendment	
<input type="checkbox"/> Electric/Water/Sewer	<input type="checkbox"/> Brief	<input type="checkbox"/> Petition for Reconsideration	<input type="checkbox"/> Reservation Letter	
<input type="checkbox"/> Gas	<input type="checkbox"/> Certificate	<input type="checkbox"/> Petition for Rulemaking	<input type="checkbox"/> Response	
<input type="checkbox"/> Railroad	<input type="checkbox"/> Comments	<input type="checkbox"/> Petition for Rule to Show Cause	<input type="checkbox"/> Response to Discovery	
<input type="checkbox"/> Sewer	<input type="checkbox"/> Complaint	<input type="checkbox"/> Petition to Intervene	<input type="checkbox"/> Return to Petition	
<input type="checkbox"/> Telecommunications	<input type="checkbox"/> Consent Order	<input type="checkbox"/> Petition to Intervene Out of Time	<input type="checkbox"/> Stipulation	
<input type="checkbox"/> Transportation	<input type="checkbox"/> Discovery	<input type="checkbox"/> Prefiled Testimony	<input type="checkbox"/> Subpoena	
<input type="checkbox"/> Water	<input type="checkbox"/> Exhibit	<input type="checkbox"/> Promotion	<input type="checkbox"/> Tariff	
<input type="checkbox"/> Water/Sewer	<input type="checkbox"/> Expedited Consideration	<input type="checkbox"/> Proposed Order	<input checked="" type="checkbox"/> Other: Testimony of Stephen M. Farmer	
<input type="checkbox"/> Administrative Matter	<input type="checkbox"/> Interconnection Agreement	<input type="checkbox"/> Protest		
<input type="checkbox"/> Other:	<input type="checkbox"/> Interconnection Amendment	<input type="checkbox"/> Publisher's Affidavit		
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BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2007-358-E

In re:)	
Application of Duke Energy Carolinas, LLC)	TESTIMONY OF
For Approval of Energy Efficiency Plan)	STEPHEN M. FARMER FOR
Including an Energy Efficiency Rider and)	DUKE ENERGY CAROLINAS
Portfolio of Energy Efficiency Programs)	
)	

This document is an exact duplicate, with the exception of the form of the signature, of the e-filed copy submitted to the Commission in accordance with its electronic filing instructions.

1 **I. INTRODUCTION AND PURPOSE**

2 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3 A. My name is Stephen M. Farmer, and my business address is 1000 East Main
4 Street, Plainfield, Indiana.

5 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

6 A. I am a former employee of Duke Energy Shared Services, Inc. On December 31,
7 2006, I retired as an employee of Duke Energy Shared Services, Inc. after serving
8 Duke Energy Indiana, Inc. and its predecessor companies for over thirty-one years. I
9 am currently self-employed and provide rate and regulatory consulting services as an
10 independent contractor. I have been retained by Duke Energy Corporation as a
11 consultant in the area of rates.

12 **Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND**
13 **AND BUSINESS EXPERIENCE.**

14 A. I am a graduate of Indiana University, holding a Bachelor of Science Degree in
15 Accounting. At the time of my retirement, I was employed by Duke Energy
16 Shared Services, Inc. as Revenue Requirements Director. I held various positions
17 within the Company's financial areas during my career. My position prior to
18 Revenue Requirements Director was that of Corporate Accounting Manager. I
19 have also held positions in the areas of Tax and Budgets and Forecasts. I am a
20 Certified Public Accountant ("CPA"), an active member of the Indiana CPA
21 Society and a past member of the American Institute of Certified Public
22 Accountants.

1 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE**
2 **COMMISSION OF SOUTH CAROLINA?**

3 A. No.

4 **Q. HAVE YOU PROVIDED TESTIMONY BEFORE ANY OTHER**
5 **REGULATORY AGENCIES?**

6 A. Yes, I have testified in numerous proceedings before the Indiana Utility Regulatory
7 Commission and the Federal Energy Regulatory Commission. I have actively
8 participated in, and have filed testimony in, Duke Energy Indiana, Inc. rate cases and
9 regulatory proceedings dating back to the mid-1980s. I have extensive experience in
10 the area of rate “tracking mechanisms.”

11 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS**
12 **PROCEEDING?**

13 A. The purpose of my testimony is to explain Duke Energy Carolinas, LLC’s (“Duke
14 Energy Carolinas” or “Company”) proposed rate making treatment related to its
15 Energy Efficiency Plan. I will discuss the key concepts and attributes of the
16 proposed energy efficiency rider (“Rider EE (SC)” or the “Rider”), as well as the
17 mechanics and calculations that are incorporated within the Rider. My testimony
18 will also provide an estimate of the expected jurisdictional rate impacts that will
19 result from the recovery of energy efficiency¹ costs through the Rider.

20 **II. RATE ADJUSTMENT MECHANISM FOR ENERGY EFFICIENCY PLAN**

21 **Q. PLEASE SUMMARIZE THE RATE ADJUSTMENT MECHANISM THAT**
22 **DUKE ENERGY CAROLINAS IS REQUESTING IN THIS PROCEEDING.**

1 A. Duke Energy Carolinas is requesting that the Public Service Commission of South
2 Carolina (the "Commission") authorize the Company to implement Rider EE (SC)
3 in order that the Company may be compensated for achieving verified capacity and
4 energy savings and by which the Company proposes to pass through to customers,
5 projected savings that relate to the Company's proposed energy efficiency programs.
6 As Company Witness Schultz discusses in his testimony, the Company is also
7 requesting approval to close certain existing demand response riders to new
8 customers and, with appropriate notice, transition existing customers to similar
9 programs included in Duke Energy Carolinas' Energy Efficiency Plan. Upon
10 Commission approval of these changes, customers will be eligible to participate in
11 the expanded list of product offerings that will be available under the Company's
12 proposed Energy Efficiency Plan.

13 The proposed Rider embodies a number of rate making principles and
14 fundamental economic concepts that are more fully explained in the testimony of
15 other Company witnesses in this proceeding. For example:

- 16 • The Energy Efficiency Plan is designed to produce energy and
17 demand savings at an overall cost to customers that is lower than
18 comparable supply-side investments. Customers will realize savings
19 by (1) reducing their consumption of energy, and (2) paying 10%
20 less than they would have been charged based on the incremental
21 cost of avoided capacity and energy.

¹ The term "energy efficiency," as used in my testimony, includes both energy efficiency/conservation and demand response measures.

- 1 • The disincentive to implementation of cost effective energy
2 efficiency programs will be reduced because, under the Company's
3 proposal, the Company will have the opportunity to achieve net
4 income levels that are commensurate with net income levels that
5 could have been earned on avoided supply-side options.
- 6 • Amounts charged to customers will be subject to an after-the-fact
7 verification of energy efficiency savings. In effect, the Energy
8 Efficiency Plan is structured on a "pay-for-results" or "pay-for-
9 value" basis. Customers will pay for "value" received and will incur
10 charges via the Rider only to the extent savings are realized. The
11 Company assumes the risk that amounts charged to customers will
12 not pay for program costs including carrying costs on unrecovered
13 program costs. There is no specific recovery of the costs of the
14 energy efficiency programs; rather, the Company takes the risk that
15 projected savings will materialize that will sufficiently compensate
16 the utility for program costs and participant incentives. Under the
17 Company's proposal, there is also no guarantee that the Company
18 will realize earnings that are equivalent to the level that would have
19 been earned on avoided supply-side options.

20 **Q. PLEASE PROVIDE AN OVERVIEW OF THE RIDER.**

21 **A.** In accordance with the Plan, the proposed Rider is designed to allow Duke Energy
22 Carolinas to collect each year a level of revenue equal to 90% of the cost of the
23 capacity and energy that the Company avoids through the capacity and energy

1 savings achieved by the programs in place that year. The calculation of the avoided
2 capacity and energy revenue requirements is designed to provide Duke Energy
3 Carolinas with revenues equal to 90% of the cost of the supply-side investment the
4 Company would have made to provide the same capacity and energy over the same
5 life as the measures and programs included within the portfolio of energy efficiency
6 programs.

7 Amounts billed to customers under the Rider will be comprised of two basic
8 components – (1) a charge based on 90% of the jurisdictional revenue requirement
9 applicable to projected avoided capacity and energy costs (“AC”); and (2) a Balance
10 Adjustment (“BA”). The Balance Adjustment captures jurisdictional revenue
11 requirement differences that result from variances between projected and actual
12 energy efficiency capacity and energy load reductions and variances between
13 projected and actual kWh sales which will cause the amount billed customers to be
14 greater than or less than what was intended. Amounts billed under the Rider EE
15 (SC) will be increased to the extent that actual load reductions exceed projected load
16 reductions. On the other hand, customers will receive a credit if the Company is
17 unable to achieve projected energy and capacity savings. The variance between
18 projected and actual load reductions will be determined based on the after-the-fact
19 measurement and verification process discussed in Dr. Stevie’s testimony.

20 Under the Company’s proposal, billing factors will be calculated separately
21 for residential and non-residential customers. The residential charge is calculated
22 based on the avoided costs of programs available to residential customers and the
23 non-residential charge is calculated based on the avoided costs of programs

1 applicable to non-residential customers. The Company proposes that the allocation
2 of program results between the North Carolina and South Carolina jurisdictions be
3 based on the relationship of jurisdictional kilowatt-hour sales.

4 **Q. WHAT IS THE SOURCE OF THE INPUTS USED TO CALCULATE THE**
5 **RIDER?**

6 A. The Company is proposing that the rate used to quantify the value of avoided
7 capacity costs be based on the methodology, data inputs and sources that are
8 normally used to calculate the standard offer rate that Duke Energy Carolinas pays
9 for energy received from qualifying facilities ("QFs"), as such term is defined in the
10 Public Utilities Regulatory Policy Act of 1978 ("PURPA"). There are a number of
11 practical reasons why the Company believes that pricing energy efficiency capacity
12 and energy savings based on QF principles is a reasonable choice. For example, the
13 methodology used to calculate the QF rate is subject to Commission review and
14 approval. The QF rates are "formula rates" that are based on accepted conceptual
15 principles that date back to PURPA. Inherent in the calculation of the rate, is the
16 concept of paying for "value received;" which is measured based on the utility's
17 avoided costs. The value of saving watts (*i.e.*, energy efficiency) should be viewed
18 as equivalent to the value of adding watts (*i.e.*, paying QFs).

19 The projection of annual avoided energy costs is described in detail in the
20 testimony of Company Witness Stevie. The energy efficiency demand (kW) and
21 energy (kWh) load impacts or savings are determined based on the cost
22 effectiveness analyses discussed by Dr. Stevie. Load savings are accumulated on a

1 vintage basis that is also explained in Dr. Stevie's testimony and is explained in
2 more detail below.

3 **Q. PLEASE EXPLAIN THE SIGNIFICANCE OF THE "VINTAGE"**
4 **CONCEPT MENTIONED ABOVE.**

5 A. First, a vintage year is defined as the beginning year of participation in energy
6 efficiency programs by a group of customers. For example, program offerings to
7 a group of customers that first begin to participate in the Company's Energy
8 Efficiency Plan in 2008 are considered to make up the 2008 "vintage year." The
9 energy efficiency measures implemented in vintage year 2008 will begin to
10 produce savings that year and will continue to produce savings over the assumed
11 measure life of each measure in each program. In the following year, if the
12 program is still open to new participants, the participants in 2009 will be in the
13 2009 vintage year, but total energy and demand savings associated with the energy
14 efficiency program in calendar year 2009 will include those achieved by
15 customers in both the 2008 and 2009 vintage years, and so on.

16 The significance of the vintage year concept is that, under the Company's
17 Energy Efficiency Plan, the pricing of avoided energy and capacity costs, both for
18 the first year and all succeeding years of participation for a particular vintage, will
19 be fixed based on the initial year of participation (*i.e.*, the vintage year). For
20 example, the pricing used to calculate avoided cost savings for each year of
21 savings for the initial vintage year 2008 Rider were the avoided capacity cost rates
22 from the recently approved QF filing; the avoided energy prices were based on the
23 Company's Integrated Resource Plan ("IRP") model and DSMore analyses used to

1 calculate the cost-effectiveness of the programs. Those same rates, including an
2 escalation factor, will be used for the life of all vintage year 2008
3 programs/measures. However, for vintage year 2009, a new avoided capacity and
4 avoided energy rate will be applied to all vintage year 2009 program/measure
5 lives.

6 **Q. PLEASE EXPLAIN THE DETAILS OF THE CALCULATION OF THE**
7 **AVOIDED CAPACITY COMPONENT INCLUDED IN THE COMPANY'S**
8 **PROPOSED ENERGY EFFICIENCY RIDER.**

9 A. The determination of annual avoided capacity costs that will ultimately be billed
10 to customers under the Company's proposed Rider EE (SC) is based on a multi-
11 step process. The first step of this process is to calculate the projected annual
12 avoided cost savings in nominal dollars for each year that programs are in place
13 for a particular vintage. The calculation takes into consideration the fact that load
14 savings applicable to programs and measures for a particular vintage year may
15 extend out for a number of years into the future. The calculation begins by
16 quantifying the projected annual avoided cost revenue requirement for the life of
17 the measure or programs. The formula included in the proposed Rider EE (SC) is
18 as follows:

19 **AACT = PD (in kW) x AAC (in \$/kW-year), expressed for**
20 **each vintage for each year in nominal year \$s**

21 **Where,**

22 **AACT = Annual Avoided Capacity Total, in \$/year**

23 **PD = Projected Demand impacts for the measure/program**
24 **by vintage year**

25 **AAC = Annual Avoided Capacity Costs**
26

1 Projected Demand Impacts are an output of the DSMore model. Dr. Stevie's
2 testimony includes a discussion and explanation of how demand impacts are
3 determined. As explained above, the annual avoided capacity cost is determined
4 based on the standard offer QF avoided capacity costs (expressed in \$/kw-year)
5 calculation of the particular vintage escalated over the life of the programs. The
6 escalation rate applicable to avoided capacity included in the Company's initial
7 energy efficiency rate filing is 4.00%.

8 The determination of annual avoided capacity savings is based on a fairly
9 straight-forward calculation. Reductions in customer loads that are projected to
10 occur due to implementation of energy efficiency demand reduction programs are
11 multiplied by the avoided cost (QF) capacity rate. The QF rate is stated on a
12 "revenue requirements" basis. In other words, demand reductions multiplied by
13 the QF rate results in an estimate of the amount that customers would have
14 theoretically been billed (revenue requirement) had the Company not
15 implemented the energy efficiency measures.

16 **Q. PLEASE EXPLAIN THE NEXT STEP USED TO CALCULATE AVOIDED**
17 **CAPACITY COSTS INCLUDED IN RIDER EE (SC).**

18 A. The calculation of the avoided capacity cost revenue requirements in the above
19 example results in a revenue stream that increases over time. An increasing revenue
20 stream may seem to be counter-intuitive given that, under traditional rate making,
21 the revenue stream from an avoided supply-side generating plant will decrease over
22 time. The decreasing revenue stream under traditional rate making is a function of
23 depreciation accruals reducing the original cost plant investment that result in

1 diminishing return requirements. The reason why the revenue stream in the above
2 example does not decrease over time but, rather, increases over time is that the
3 avoided cost QF rate recovers costs on a "levelized" basis. In addition, the QF rate
4 captures the effects of inflation that cause the cost of avoided capacity to be higher
5 as one goes out into the future. When I say that the QF rate recovers avoided
6 capacity costs on a levelized basis, I am referring to the fact that the declining
7 revenue stream that one would normally expect under traditional rate making is
8 converted to an amount that is fixed/levelized over the life of the asset. The
9 calculation is based on the calculation of an annuity from a present value.

10 The most common example of the recovery of costs on a levelized basis is
11 the repayment of a loan (*e.g.*, home mortgage). Mortgage payments are set up to
12 amortize the initial principle balance of the loan (compares to investment in an
13 avoided supply-side option) based on a stream of payments that are fixed over the
14 life of the loan. The fixed stream of payments recovers interest costs on the
15 unrecovered balance of the loan principle (equivalent to return on an avoided
16 supply-side option) and the principle balance itself (equivalent to return of, or
17 depreciation expense, on an avoided supply-side option). Payments in the early
18 years of the loan do not recover the true cost of the loan. Payments in the latter part
19 of the loan's life recover amounts that exceed the true cost of the loan.

20 Theoretically, the recovery of costs/revenues on a levelized basis is
21 equivalent to the recovery of costs/revenues on a declining balance/traditional rate
22 making basis when both revenue streams are converted to net present value.

23 However, the cumulative sum of revenues recovered on a levelized basis will be

1 greater than revenues on a declining basis because the recovery of costs on a
2 levelized basis is back-end loaded.

3 The point of this discussion is that if the calculation of avoided capacity
4 costs is priced based strictly on the QF rate, then the value of the avoided capacity
5 will be back-end loaded. The revenue requirement that results from this process
6 will not match up with revenue requirements under traditional rate making.
7 Although levelization of costs can be an appropriate alternative to traditional rate
8 making methodologies and procedures, in this case we are attempting to put EE
9 on an equal footing with supply-side options, and to remove any disincentives that
10 might create an impediment to implementation of cost effective energy efficiency
11 programs.

12 Further, revenue requirement recovery that is back-end loaded does not
13 provide for timely and concurrent matching of revenues and expenses. For
14 example, the Company will pay participating customers incentives to produce
15 energy efficiency savings upfront, therefore the revenue requirements associated
16 with the achieved savings should ideally coincide with the timing of those
17 incentives. The Company's proposed Rider EE (SC) addresses this issue, as
18 discussed more fully below.

19 **Q. HOW DOES THE COMPANY'S PROPOSAL REFLECT THIS BACK-**
20 **LOADING OF REVENUES?**

21 A. The stream of avoided cost revenue requirement is converted to a present value
22 amount by discounting the future avoided cost revenue stream using the
23 Company's before-tax weighted average cost of capital as the discount rate. The

1 Company then amortizes the present value revenue requirement over the life of
2 the programs that gave rise to the avoided cost capacity savings and calculates
3 carrying costs on the unamortized balance at the Company's before-tax weighted
4 average cost of capital. Note that the Company has revised this calculation
5 somewhat from the one provided in its initial Application. The Company
6 believes that the return on avoided capacity costs should be based on the weighted
7 average cost of capital, including both a debt and equity component, just as the
8 Company is compensated for generation plant based on the weighted average cost
9 of capital that includes both debt costs and equity returns.

10 The result of these calculations is that the revenue stream billed customers
11 will be reshaped to look more like the revenue stream that would occur under
12 normal rate making. The formula included in the Rider EE (SC) that reshapes the
13 revenue stream is as follows:

14 **ACC = the sum of (DC + ROR x ACI) for each vintage year of**
15 **each measure/program**

16 Where,

17 **ACC = Avoided Capacity Revenue Requirements**

18 **DC = Depreciation of the Avoided Capital Investment (ACI),**
19 **calculated using straight-line depreciation over the life of the**
20 **measure/program for each vintage year of the program.**

21 **ROR = Rate of Return from the Avoided Cost Filing**

22 **ACI = Present Value of the sum of the annual avoided capacity**
23 **total (AACT) less accumulated depreciation (Sum of DC for**
24 **current year and all previous years for that vintage) for each**
25 **vintage of each measure/program over the life of the**
26 **measure/program, with the Pre-Tax Weighted Cost of Capital as**
27 **the discount rate.**

28 **Pre-Tax Weighted Cost of Capital will be based on the capital**
29 **structure, cost of long term debt, cost of common equity, and**
30 **effective tax rate as included in the Avoided Cost Filing**
31

32
33 **Q. PLEASE DISCUSS HOW ENERGY SAVINGS ARE HANDLED IN THE**
34 **RIDER.**

1 A. The energy impacts (*i.e.*, kWh impacts) of each energy efficiency measure are
2 obtained from the DSMore analyses described by Dr. Stevie. These impacts
3 represent an estimate of load reductions that will occur on Duke Energy
4 Carolina's system for each hour of each day of the year. The hourly kWh
5 reductions are multiplied by the hourly marginal energy costs from the production
6 costing model used by Duke Energy Carolinas in its IRP analysis in order to
7 estimate the savings that customers will realize.² This calculation of energy cost
8 savings is captured in the Rider EE (SC) by the following formula(s):

9 **AAET = PE (in kWh) x AEC (in \$/kwh/year), expressed for**
10 **vintage for each year in nominal year \$s**

11 Where,

12 **AAET** = Annual Avoided Energy Total (in \$/year)

13 **PE** = Projected Energy impacts for the measure/program by
14 vintage year

15 **AEC** = Annual Avoided Energy Costs from modeling
16 results that calculate the annual energy costs for the Duke
17 Energy Carolinas system with and without the portfolio of
18 energy efficiency programs. The difference between the
19 energy costs for the portfolio is assigned to individual
20 program/measure vintage years to determine the Annual
21 Avoided Energy Costs for the program/measure by vintage
22 year.

23
24 Under the Company's proposal, the future stream of projected energy cost
25 savings will be converted to a net present value amount by discounting the
26 projected savings using the Company's before-tax overall weighted average cost
27 of capital. The Company will then develop a stream of annual revenue
28 requirement to be billed customers by amortizing the present value balance over

² Note that, for the initial Rider, the Company used an alternative estimate of avoided energy costs due to the fact that the timing of the Application was well in advance of the finalization of the 2007 IRP process. For future calculations of the Rider, the avoided energy costs will be calculated through the IRP process to the extent possible.

1 the life of the programs that gave rise to the avoided costs energy savings and
2 will calculate carrying costs on the unamortized balance.

3 **Q. PLEASE EXPLAIN WHY THE COMPANY CHOSE TO CONVERT THE**
4 **FUTURE STREAM OF ENERGY COST SAVINGS TO A PRESENT**
5 **VALUE AMOUNT.**

6 A. The rationale for converting the future stream of energy cost savings to a present
7 value amount is not the same as the reasoning behind the reshaping of avoided
8 capacity savings. As explained in my testimony above, avoided capacity savings
9 were reshaped so that the revenue and earnings stream would look similar to the
10 revenue and earnings stream of an avoided supply-side option. In addition, the
11 revenue stream was reshaped to offset the back-end loading issue discussed
12 above. In effect, revenues relating to avoided capacity costs are more earnings
13 driven. Revenues relating to the recovery of avoided energy cost savings are
14 more a function of cash flow and are expense driven. For example, the Company
15 will expend a significant amount of upfront cash (*i.e.*, upfront program costs) in
16 order to achieve future avoided cost energy savings. Granted, under the
17 Company's save-a-watt proposal, customers will only pay for results achieved and
18 value realized as opposed to paying for program costs directly.

19 However, under the Company's proposal, upfront expenditures incurred to
20 achieve savings (*i.e.*, program costs), including carrying costs on unrecovered
21 upfront expenditures, will be funded through the retained percentage of avoided
22 energy cost savings. The reshaping of the stream of energy cost savings has the
23 effect of mitigating to some extent the negative cash flow effects resulting from

1 the difference between cash flow out and cash flow in. One can view the
2 Company's proposal as a compromise between normal rate making that would
3 treat upfront program costs as a period expense subject to recovery in the year
4 incurred and the Company's proposal which, in my mind, is more of a deferred
5 payment plan.

6 The formula included in the Rider EE (SC) that reshapes the
7 revenue stream is as follows:

8 **ACE = the sum of (DE + ROR x AEI) for each vintage year of**
9 **each measure/program**

10
11 Where,

12 **ACE = Avoided Energy Revenue Requirement**

13 **DE = Depreciation of the Avoided Energy Investment (AEI),**
14 **calculated using straight-line depreciation over the life of the**
15 **measure/program.**

16 **ROR = Rate of Return from the Avoided Cost Filing**

17 **AEI = Present Value of the sum of the annual avoided energy total**
18 **(AAET) less accumulated depreciation (Sum of DE for current**
19 **year and all previous years for that vintage) for each**
20 **measure/program over the life of the measure/program, with the**
21 **Pre-Tax Weighted Cost of Capital as the discount rate.**
22

23 **Q. HOW ARE THE AVOIDED CAPACITY AND ENERGY VALUES THAT**
24 **YOU HAVE DESCRIBED FINALLY INCLUDED IN THE CALCULATION**
25 **OF BILLING FACTORS UNDER RIDER EE (SC)?**

26 **A.** The Avoided Capacity Revenue Requirement, or ACC, and the Avoided Energy
27 Revenue Requirement, or ACE, is summed and multiplied by 90% to determine the
28 Avoided Cost Revenue Requirement, or AC, to be collected from customers during
29 the rider period. The Rider only collects the revenue requirements associated with
30 the year in which the Rider is in effect. Thus, programs with measure lives of five
31 years have revenue requirements included over five successive years, and programs

1 with 15 year lives over 15 years. The final expression of the formula which results
2 in the sharing of avoided cost capacity and energy savings is as follows: .

3
$$AC = (ACC + ACE) \times 90\% \times SC \text{ Allocation Percentage}$$

4 Where,

5 AC = Avoided Cost (Capacity and Energy) Revenue Requirement

6 ACC = Avoided Capacity Revenue Requirement

7 ACE = Avoided Energy Revenue Requirement

8 90% = the percentage of avoided costs to be collected through the
9 Rider

10 $SC \text{ Allocation Percentage}$ = Projected kWh Sales for the Rider
11 Period for the class (residential or non-residential) of SC retail
12 customers / Projected kWh Sales for the Rider Period for the class
13 (residential or non-residential) of NC and SC retail customers.
14
15

16 **Q. PLEASE DISCUSS THE TRUE-UP MECHANISM.**

17 A. When evaluations of programs and measures are complete, the true-up mechanism
18 will ensure the Company's revenues are adjusted such that the Company is paid
19 only for results achieved. The testimony of Company Witness Stevie discusses
20 the specific items that will be trued up in subsequent Rider EE (SC) filings and
21 the proposed timing of those true-ups. The true-up mechanisms described in Rider
22 EE (SC) is called the Balance Adjustment. The Balance Adjustment mechanism
23 calculates the revenues actually collected for the evaluated programs and
24 compares that to the revenue requirement that would have been calculated at the
25 time if the actual results had been known. The difference is the Balance
26 Adjustment, which can be positive or negative.

27 The Balance Adjustment is calculated by determining both the revenue
28 requirement that the Company would be entitled to based on verified results and
29 the revenues the Company actually collected under Rider EE (SC) during a
30 previous period. This is expressed on page 3 of the Rider as follows:

1 **BA = RREP - AREP**

2
3 Where,

4
5 **BA** = Balance Adjustment

6 **RREP** = Revenue Requirements for the Evaluation Period

7 **AREP** = Actual Revenues from the Evaluation Period (which
8 reflect 90% of avoided costs) from South Carolina retail customers

9 **Evaluation Period** = the time period to which the evaluation
10 results apply.

11
12 **Q. PLEASE EXPLAIN HOW THE REVENUE REQUIREMENT TO WHICH**
13 **THE COMPANY WOULD BE ENTITLED BASED ON VERIFIED**
14 **RESULTS IS CALCULATED.**

15 **A.** A revenue requirement was calculated for each vintage of each measure/program.
16 Upon verification of the capacity (kW) and energy (kWh) impacts of a vintage of
17 a measure/program, the revenue requirement for that vintage and measure will be
18 recalculated. This is expressed on page 4 of the Rider as follows:

19 **RREP = 90% x SC Allocation Percentage x**
20 **((ΣACC(Evaluation Period) x AD/PD(Evaluation Period)) +**
21 **Σ(AEC (Evaluation Period) x AE/PE(Evaluation Period))), for**
22 **each measure/program and then summed**

23
24 Where,

25 **RREP** = Revenue Requirement for the Evaluation Period

26 **SC Allocation Percentage** = = Projected kWh Sales for the Rider
27 Period for the class (residential or non-residential) of SC retail
28 customers / Projected kWh Sales for the Rider Period for the class
29 (residential or non-residential) of NC and SC retail customers.

30 **ACC (Evaluation Period)** = Avoided Capacity Revenue
31 Requirement as calculated for the Evaluation Period for the
32 measure/program

33 **AD** = Actual Demand results as validated by program evaluation
34 for the measure/program

35 **PD (Evaluation Period)** = Projected Demand results as calculated
36 for the Evaluation Period for the measure/program

37 **AEC (Evaluation Period)** = Avoided Energy Revenue
38 Requirement as calculated for the Evaluation Period for the
39 measure/program

40 **AE** = Actual Energy results as validated by program evaluation for
41 the measure/program

1 **PE (Evaluation Period) = Projected Energy results as calculated**
2 **for the Evaluation Period for the measure/program**
3

4 **Q. HOW ARE THE ACTUAL REVENUES COLLECTED DETERMINED?**

5 A. The Company will know the actual total Rider EE (SC) revenues collected during
6 previous periods. Actual revenues will be different than the revenue requirement
7 to which the Company is entitled for two reasons: (1) because the Rider was
8 based on projected kWh sales which will differ from actual kWh sales; and (2)
9 because the verified kW and kWh impacts are greater or less than expected at the
10 time the Rider was calculated. However, verified results will not be known for
11 all programs/measures at the same time. Thus, the proposed formula prorates the
12 collected revenues over each measure/program. This is expressed on page 3 of
13 the Rider as follows:

14 **$AREP = \frac{[EE(\text{Evaluation Period}) \times AKWH - BA(\text{Evaluation Period})] \times RREP}{AC(\text{Evaluation Period})}$**
15

16 Where,
17

18 **AREP = Actual Revenues from the Evaluation Period**

19 **EE(Evaluation Period) = Rider EE (SC) (cents/kwh) for**
20 **the class of customers in effect during the evaluation period**
21 **AKWH = actual kWh sales for the evaluation period for**
22 **the class**

23 **RREP = Revenue Requirements for the Evaluation Period**

24 **BA(Evaluation Period) = BA for the class of customers in**
25 **effect during the Evaluation Period.**

26 **AC (Evaluation Period) = Avoided Cost (Capacity and**
27 **Energy) Revenue Requirement for the evaluation period**
28

29 **Q. HOW ARE THE AVOIDED COST AND BALANCE ADJUSTMENT**
30 **VALUES CONVERTED TO THE PROPOSED RATE?**

31 A. Each year the avoided cost value (AC) and the balance adjustment (BA) will be
32 summed separately for residential and non-residential customers. The sums will

1 be divided by the projected South Carolina retail kWh sales for the class to arrive
2 at the Rider EE (SC) value.

3 **Q. WHAT IS THE PROPOSED INITIAL RIDER AMOUNT?**

4 A. The proposed Rider is \$0.001233/kWh for Duke Energy Carolinas' South Carolina
5 retail residential customers and \$0.001019/kWh for non-residential customers. The
6 derivation of these rates is shown on Farmer Exhibit No. 2.

7 **III. EXPECTED RATE IMPACT TO CUSTOMERS**

8 **Q. WHAT IS THE ANTICIPATED IMPACT OF THE PLAN ON THE RATES**
9 **OF DUKE ENERGY CAROLINAS' SOUTH CAROLINA CUSTOMERS?**

10 A. The Energy Efficiency Plan will have a very modest impact on the rates of the
11 Company's South Carolina customers. Our analysis indicates that the cost to
12 customers, as adjusted by eliminating energy efficiency/DSM amounts currently in
13 base rates, will increase less than 0.65% on a price per kWh basis in the first year for
14 all customer classes. Duke Energy Carolinas' South Carolina customers' current
15 base rates include approximately \$18 million in costs associated with energy
16 efficiency/DSM programs. If the Company's proposal to implement Rider EE (SC)
17 is approved by the Commission, the Company plans to file revised base rates, which
18 will remove this cost to prevent any double recovery of energy efficiency/DSM
19 revenue requirements.

20 **Q. PLEASE DESCRIBE THE ANNUAL "PROCESS FLOW" OF THE**
21 **COMPANY'S ENERGY EFFICIENCY PLAN AND ITS ASSOCIATED**
22 **REGULATORY FILINGS.**

1 A. If this Commission approves the Company's Energy Efficiency Plan and Rider EE
2 (SC) as proposed, we request that actual implementation of Rider EE (SC) begin
3 three months after approval. Once the Rider takes effect, the Company will begin
4 collecting the data that is necessary for the true-up and Balance Adjustment process
5 for the first Evaluation Period. On the anniversary of implementation, Duke Energy
6 Carolinas will close the collection of the first year's data and begin the analysis of
7 that data, which will include appropriate third party measurement and verification,
8 as more particularly described in Company Witness Stevie's testimony.

9 The Company proposes that approximately four months after the end of the
10 first Evaluation Period it will file a report with this Commission in this docket with
11 respect to that Evaluation Period. That report will contain an analysis of the results
12 of the first year's operation of the Plan and will set out the Company's proposal for
13 the amount of the Rider EE (SC) that will be in effect for the following year (*i.e.*, on
14 the second anniversary date of Rider EE (SC)). Duke Energy Carolinas proposes
15 that the Office of Regulatory Staff (the "ORS") and the other parties of record in this
16 docket have a period of 75 days to review the Company's report. If there is no
17 objection by the ORS or other parties, the proposed Rider EE (SC) will take effect
18 on the second anniversary date of the Rider EE (SC) without further hearing. If
19 there is an objection prior to the deadline, the matter will be scheduled for hearing
20 so that any disputes can be resolved in time to implement the new Rider by the
21 second anniversary date.

22 **Q. WOULD YOU GIVE US AN EXAMPLE OF HOW THIS PROCESS**
23 **WOULD WORK?**

1 A. Certainly. If we assume that the proposed Rider EE (SC) is approved in this
2 proceeding and this Commission orders that it be implemented beginning on July 1,
3 2008, then data for the Evaluation Period will be collected from July 1, 2008
4 through June 30, 2009. That data will be analyzed and a report prepared and filed
5 by the Company by October 30, 2009. The ORS and other parties will have until
6 January 15, 2010 to review the report and determine if they have any objections. If
7 there are objections that cannot be resolved, the matter would be scheduled for
8 hearing so that a determination can be made on the amount of the new Rider EE
9 (SC) by April 30, 2010 to enable the Company to implement the new Rider on July
10 1, 2010.

11 Because measurement and verification will be an ongoing effort after the
12 first year of the Energy Efficiency Plan, Duke Energy Carolinas anticipates that it
13 will update the Rider on an annual basis after the initial two-year period.

14 **Q. IS THE COMPANY PROPOSING TO FOLLOW THIS PROCESS ON AN**
15 **ANNUAL BASIS?**

16 A. Yes. However, as explained by Company Witness Stevie, all the measurement and
17 verification required for the first year true-up proceeding will not be complete in
18 time to incorporate the results in the first Rider EE (SC) true-up. The Company will
19 true-up customer participation and installed measures at that time, but any required
20 adjustment to free riders, kWh, or kW impacts resulting from measurement and
21 verification studies will not be reflected until a subsequent Rider EE (SC) true-up
22 proceeding after the results are known. For subsequent Rider EE (SC) true-ups, the
23 Company proposes the same process be followed as for the first year with the parties

1 having a period to review its filing, followed by a hearing, if necessary, to resolve
2 any objections.

3 **IV. CONCLUSION**

4 **Q. PLEASE SUMMARIZE THE SPECIFIC RATE MAKING APPROVAL**
5 **REQUESTED BY DUKE ENERGY CAROLINAS.**

6 A. Duke Energy Carolinas is seeking approval of Rider EE (SC), which includes the
7 formula for calculation of the Rider, as well as the charge to be effective for the
8 initial Rider period. As explained above, the Company will make subsequent Rider
9 EE (SC) filings to revise the Rider amounts to reflect new estimates of energy
10 efficiency savings impacts for subsequent periods and to true up the previous
11 estimates and Rider amounts. Therefore, the Company is not seeking approval, at
12 this time, for any revenue requirements associated with its estimate of savings for
13 subsequent periods.

14 **Q. WERE FARMER EXHIBITS NOS. 1 AND 2 PREPARED BY YOU OR**
15 **UNDER YOUR SUPERVISION?**

16 A. Yes.

17 **Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

18 A. Yes.

Duke Energy Carolinas, LLC

South Carolina Original (Proposed) Leaf No. ____

RIDER EE (SC)
ENERGY EFFICIENCY RIDER

APPLICABILITY (South Carolina Only)

Service supplied under the Company's rate schedules are subject to approved energy efficiency adjustments over or under the Rate set forth in the approved rate schedules as determined by the following formula:

EEA (residential) =

$$\frac{\text{AC} + \text{BA, as assigned to the residential class of customers}}{S_{\text{res}}}$$

EEA (non-residential) =

$$\frac{\text{AC} + \text{BA, as assigned to the non-residential class of customers}}{S_{\text{non-res}}}$$

Where,

EEA = Energy Efficiency Adjustment

S = Projected kWh Sales for the Rider Period for the class (residential or non-residential) of SC retail customers

AC = Avoided Cost (Capacity and Energy) Revenue Requirement

BA = Balance Adjustment

EEA is calculated for a 12 month period, referred to as the **Rider Period**.**AC = (ACC + ACE) X 90% X SC Allocation Percentage**

Where,

ACC = Avoided Capacity Revenue Requirement

ACE = Avoided Energy Revenue Requirement

90% = the percentage of avoided costs to be collected through the Rider

SC Allocation Percentage = Projected kWh Sales for the Rider Period for the class (residential or non-residential) of SC retail customers / Projected kWh Sales for the Rider Period for the class (residential or non-residential) of NC and SC retail customers.

ACC = the sum of (DC + ROR x ACI) for each vintage year of each measure/program

Where,

Measure/program: Programs are a collection of energy efficiency measures which represent individual efficiency technologies available to customers. Each program or measure has a unique set of characteristics, including cost, operational life, and capacity and energy impacts. ACC is calculated based on the assumed life of each program or measure.

Vintage: ACC is calculated for each program/measure separately. A vintage year is the beginning year of participation for a group of participants. A group that participates in a program in the first year is in "vintage year 1", but will continue to produce savings due to measures installed over the program's assumed life. In the following year, results will be experienced from both vintage year 1 and 2. With each succeeding year, a new ACC vintage is calculated for that year's incremental capacity and energy impacts.

DC = Depreciation of the Avoided Capital Investment (ACI), calculated using straight-line depreciation over the life of the measure/program for each vintage year of the program.

ROR = Rate of Return from the **Avoided Cost Filing**

ACI = Present Value of the sum of the annual avoided capacity total (AACT) less accumulated depreciation (Sum of **DC** for current year and all previous years for that vintage) for each vintage of each measure/program over the life of the measure/program, with the **Pre-Tax Weighted Cost of Capital** as the discount rate.

Pre-Tax Weighted Cost of Capital will be based on the capital structure, cost of long term debt, cost of common equity, and effective tax rate as included in the **Avoided Cost Filing**.

Values from the **Avoided Cost Filing** are determined as follows: the values proposed by Duke Energy Carolinas in South Carolina in the most recently avoided cost filing, until an Order approving the filing is issued by the Commission. Following a Commission Order on the Filing, the values approved by the Commission up until a new avoided cost filing is made.

Where,

AACT = **PD (in kW) x AAC (in \$/kW-year)**, expressed for each vintage for each year in nominal year \$s

Where,

PD = Projected Demand impacts for the measure/program by vintage year

AAC = Annual Avoided Capacity Costs (based on interconnection to the transmission system) from the **Avoided Cost Filing**, escalated using the **Escalation Factor**, to obtain nominal year \$ values for each year of the measure/program.

Escalation Factor = escalation factor used in **Avoided Cost Filing** for escalation of capital costs.

ACE = the sum of (DE + ROR x AEI) for each vintage year of each measure/program

Where,

DE = Depreciation of the Avoided Energy Investment (**AEI**), calculated using straight-line depreciation over the life of the measure/program.

AEI = Present Value of the sum of the annual avoided energy total (**AAET**) less accumulated depreciation (Sum of **DE** for current year and all previous years for that vintage) for each measure/program over the life of the measure/program, with the **Pre-Tax Weighted Cost of Capital** as the discount rate.

Where,

AAET = **PE** (in kWh/year) x **AEC** (in \$/kwh/year), expressed for vintage for each year in nominal year \$s

Where,

PE = Projected Energy impacts for the measure/program by vintage year

AEC = Annual Avoided Energy Costs from modeling results that calculate the annual energy costs for the Duke Energy Carolinas system with and without the portfolio of energy efficiency programs. The difference between the energy costs for the portfolio is assigned to individual program/measure vintage years to determine the Annual Avoided Energy Costs for the program/measure by vintage year. The modeling is consistent with the methodology used for energy cost determination in the Avoided Cost filings and Integrated Resource Plans.

BA = RREP - AREP

Where,

AREP = Actual Revenues from the Evaluation Period (which reflect 90% of avoided costs) from South Carolina retail customers

RREP = Revenue Requirements for the Evaluation Period

Evaluation Period = the time period to which the evaluation results apply.

Where,

AREP =
$$\frac{[EE(\text{Evaluation Period}) \times AKWH - BA(\text{Evaluation Period})] \times RREP}{AC(\text{Evaluation Period})}$$

Where,

EE (Evaluation Period) = Rider EE (SC) (cents/kwh) for the class of customers in effect during the evaluation period

AKWH = actual kWh sales for the evaluation period for the class

BA(Evaluation Period) = **BA** for the class of customers in effect during the Evaluation Period.

RREP = 90% x SC Allocation Percentage x ((\sum ACC(Evaluation Period) x AD/PD(Evaluation Period)) + \sum (AEC (Evaluation Period) x AE/PE(Evaluation Period))), for each measure/program and then summed

Where,

ACC (Evaluation Period) = Avoided Capacity Revenue Requirement as calculated for the Evaluation Period for the measure/program

AD = Actual Demand results as validated by program evaluation for the measure/program

PD (Evaluation Period) = Projected Demand results as calculated for the Evaluation Period for the measure/program

AEC (Evaluation Period) = Avoided Energy Revenue Requirement as calculated for the Evaluation Period for the measure/program

AE = Actual Energy results as validated by program evaluation for the measure/program

PE (Evaluation Period) = Projected Energy results as calculated for the Evaluation Period for the measure/program

EFFECT ON RATES

As a result of the Commission's (date) Order in Docket No. 2007-358-E, the Energy Efficiency Rider is included in the current rate schedules effective for service on and after (date). The effect of the Commission's Order, including its impact on the Company's gross receipts tax expense, is an increase of 0.1233 cents per kWh on residential rate schedules and 0.1019 cents per kWh on nonresidential rate schedules.

USE OF RIDER

Since adjustments are already included in the Rates of the Company's current rate schedules which are effective for service on and after (date), this Rider should not be used in addition to such rate schedules for bill calculations.

DERIVATION OF RIDER EE (SC) RATE

South Carolina residential revenue requirement = SC residential revenue requirement /
(Projected 2008 SC residential retail sales - SC residential EE Impacts) / 1000, where:

- South Carolina residential revenue requirement = \$7,919,560
- Projected 2008 SC residential retail sales = 6,429,079,000 kWh
- Projected 2008 SC residential EE Impacts = 4,251,000 kWh

$$\$7,919,560 / (6,429,079,000 - 4,251,000) = \$0.001233/\text{kWh}$$

South Carolina non-residential revenue requirement = SC non-residential revenue
requirement / (Projected 2008 SC non-residential retail sales - SC non-residential EE
Impacts), where:

- South Carolina non-residential revenue requirement = \$15,829,264
- Projected 2008 SC non-residential retail sales = 15,541,312,000 kWh
- Projected 2008 SC non-residential EE Impacts = 2,053,000 kWh

$$\$15,829,264 / (15,541,312,000 - 2,053,000) = \$0.001019/\text{kWh}$$

**BEFORE
THE PUBLIC SERVICE COMMISSION
OF SOUTH CAROLINA
DOCKET NO. 2007-358-E**

In Re:)
)
Application of Duke Energy)
Carolinas, LLC for Approval of)
Energy Efficiency Plan Including an)
Energy Efficiency Rider and)
Portfolio of Energy Efficiency)
Programs)

CERTIFICATE OF SERVICE

This is to certify that I, Leslie L. Allen, a legal assistant with the law firm of Robinson, McFadden & Moore, P.C., have this day caused to be served upon the person(s) named below the **Testimony of Stephen M. Farmer** in the foregoing matter by placing a copy of same in the United States Mail, postage prepaid, in an envelope addressed as follows:

Jeremy C. Hodges, Esquire
Nelson Mullins Riley & Scarborough, LLP
P.O. Box 11070
Columbia, SC 29211


Scott A. Elliott, Esquire
Elliott & Elliott, PA
721 Olive Avenue
Columbia, SC 29205

J. Blanding Holman, IV, Esquire
Southern Environmental Law Center
200 W. Franklin Street, Suite 330
Chapel Hill, NC 27516

Robert E. Tyson, Jr., Esquire
Sowell Gray Stepp & Laffitte, LLC
Post Office Box 11449
Columbia, SC 29211

Nanette S. Edwards, Esquire
Office of Regulatory Staff
Post Office Box 11263
Columbia, SC 29211

Dated at Columbia, South Carolina this 10th day of December, 2007.



Leslie L. Allen